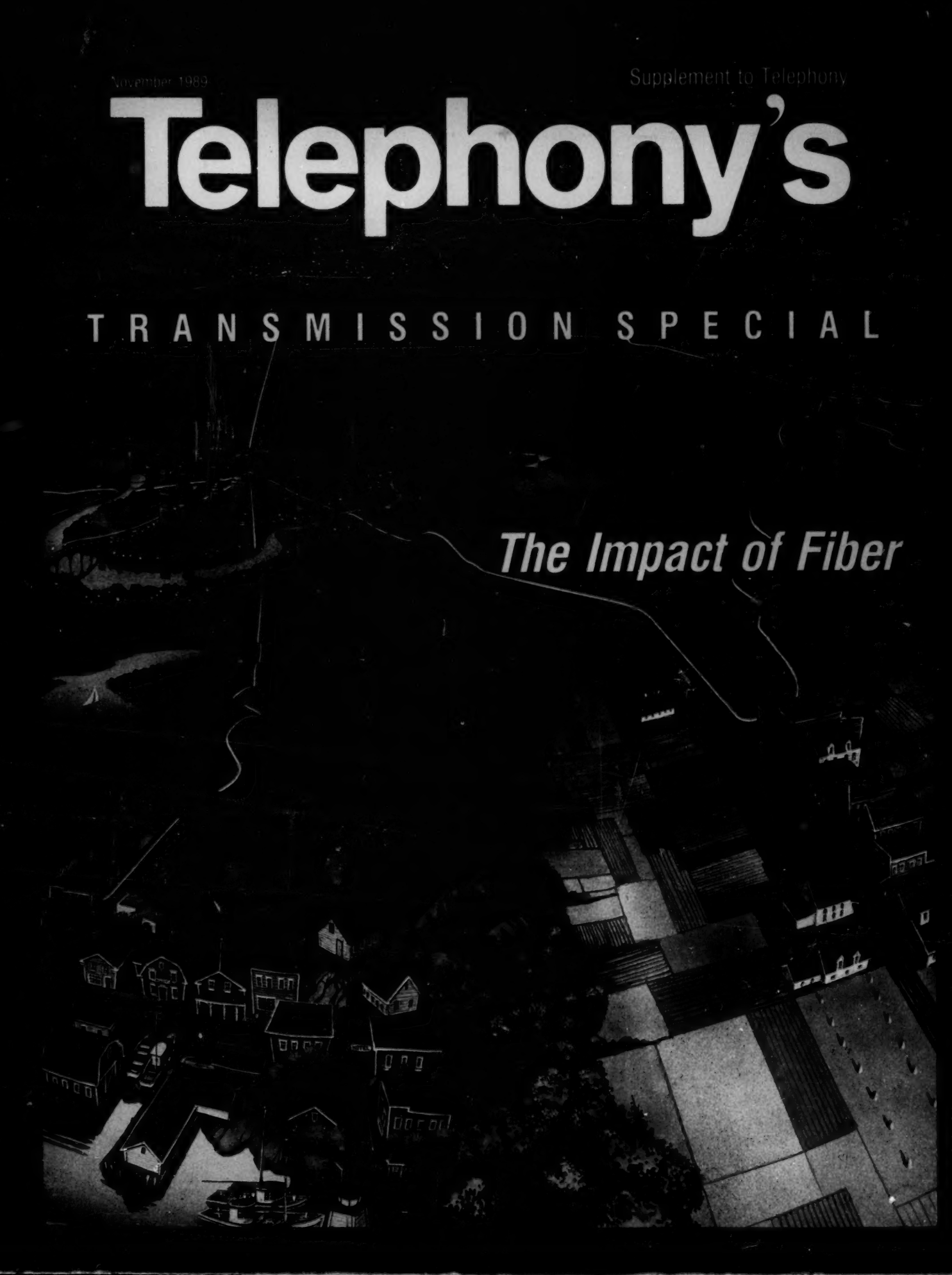
November 1989

Supplement to Telephony

Telephony's

TRANSMISSION SPECIAL

The Impact of Fiber



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A focus on change

A year ago, when *Telephony* produced its first special issue on transmission, we wanted to focus on a segment of the industry that was undergoing dramatic change. Our topic choices were pretty clear-cut—the division between transmission and other industry segments was a fairly easy one to make.

As dramatic change continues within this complex field, however, the once-clear distinctions between the transmission, switching and even customer premises equipment segments are being blurred. I believe our choice of topics for this issue reflects that change.

The driving factor behind this transition remains the ever-expanding capabilities of fiber optics. With single-fiber capacity approaching 2.4 Gb/s, there is both tremendous opportunity and enormous challenge ahead for public network carriers. Managing, protecting, developing and standardizing applications that take advantage of that capacity all loom as major issues.

But, as this issue reflects, there is movement forward on most fronts. The single most significant key is the introduction of the synchronous optical network standard. Progress on SONET standards has been rapid, and some vendors already have SONET-compatible equipment in the market.

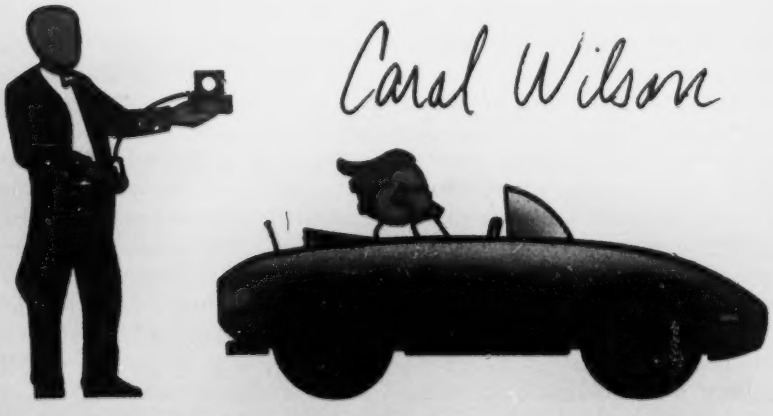
SONET promises to offer the ability to manage tremendous fiber capacity more efficiently, and to deliver high-speed services on demand to end users. Business users are already demanding these kinds of services, particularly for networking computers, making fiber to the desktop another trend to watch. Standards for these services are also coming together more quickly than expected.

The Bell regional holding companies are pushing forward on still another key front: Advanced Intelligent Network deployment. Although the long-range plans for AIN have been delayed until the 1993-95 time frame, at least five of the seven RHCs are set to offer targeted AIN-based services by 1991.

Meanwhile the local exchange community is also getting a handle on the technical problems of taking fiber to the home. While the critical stumbling blocks on this front remain ones of national policy, there are also matters of installation, maintenance and powering that must be faced.

A crucial decision on potential network architecture changes in this arena may loom for LECs, and further developments in fiber electronics promise even greater capabilities by the end of the decade.

Once again, we offer a snapshot of an industry undergoing dramatic change. Parts of the picture are in clear focus; others remain much less so.



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INTERTEC

Fiber to the home: A family affair

Telco trials are getting a lot of hype but they're business as usual for the residents involved. And that's the way telcos want it

DAWN BUSHAUS, *Assistant Editor*
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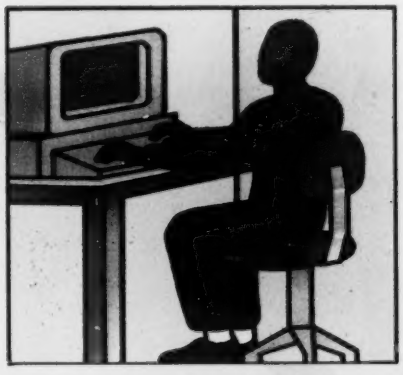


A few years ago, the only exposure typical residential telephone users had to fiber optics was through US Sprint television ads, which promoted that company's "pin-drop" quality fiber optic network.

But that fiber now is in the process of traveling directly up to and possibly into their homes, through fiber-to-the-home trials currently in progress (see table on page 31). Are users noticing a difference with fiber phone service? Not really. But that is actually a measure of success.

If these trials are successful, the transmission medium for telephone service and, in some cases, cable TV, will remain a matter of little interest to the customers.

Fiber, Fiber, Everywhere

There is no question that fiber will become ubiquitous in the "last mile," but the issue is when. Southwestern Bell has decided, based on its trials, to offer limited fiber to the home for all new developments by 1992. Other companies are using trials to become familiar with the technology, but have not set any guidelines for widespread availability of fiber.

"I don't expect fiber to the home to take off before 1995," says Mark Lutkowitz, president of Trans-Formation Inc., a Tulsa, Okla.-based market research firm. "The hardware won't be available before 1995, so most likely it will be between 1995 and 2000." Questions remain about electrical power for services over fiber, backup systems, regulation and standards.

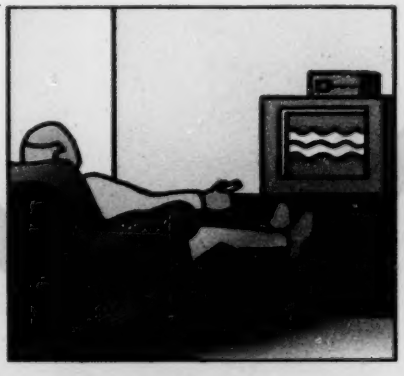
"There is a lot of hype about trials that leads you to think fiber to the home will happen tomorrow," he says. But public utility commissions aren't going to approve the cost of taking fiber to the home until it can be proven-in on POTS alone, he adds, because close to half of the ratepayers won't take advantage of extra services. Since most basic services can still be offered over copper for less money, that's a hard case to make. Telcos are looking for less expensive ways to, among other things, supply an optical interface between fiber and the existing wiring in most houses.

Revised network architectures coming from AT&T and Raynet make the upfront fiber costs less than analog copper within 100 yards of the residence, says John P. Ryan, vice president of Electronicast, a consulting and technology analysis firm in San Mateo, Calif. "The bad news is they didn't get [to the home with fiber], but who cares?" he says. The point, he says, is that the industry is now getting close to the reality of fiber to the home. "Manufacturers and telcos now understand what they have to do to get fiber to the home and make it cost less than copper. That wasn't possible a year ago."

Raynet's system is a fiber-to-the-curb operation, based on a bus architecture (see story on page 40). It is scheduled for a trial in Lynnfield, Mass. AT&T's system uses its SLC Series 5 digital loop carrier in a fiber-to-the-pedestal arrangement being tested by Southwestern Bell in Olathe, Kan.

Bell Atlantic's Experience

Bell Atlantic currently has two technical fiber-to-the-home trials—Bell of Pennsylvania's POTS and video trial in Perryopolis, and New Jersey Bell's Princeton Gate subdivision trial in South Brunswick. Like most of the BOCs' fiber trials, these two were set up primarily to "scope the technical aspects of deploying fiber



to the home—the craft, new techniques, new procedures," says Colton O'Donoghue, manager of outside plant engineering for Bell Atlantic. For the Perryopolis trial, fiber runs from the CO to each home. At Princeton Gate, the fiber runs from the CO to remote terminal housings and then to each subscriber's home.

According to O'Donoghue, both

continued on page 31

FIBER-TO-THE-H

Telco	Announced	Location	Date of service	No. of
Alltel	Oct. 89	Piper Glen, N.C.	Dec. 89	30
Ameritech	Aug. 88	Ohio	n/a	100
Bell of Pa.	June 88	Perryopolis, Pa.	Winter 89	100
Contel	Oct. 87	Ridgecrest, Calif.	1st Q 89	400
Contel	Oct. 87	Sidney, N.Y.	during 89	600
Contel	Early 89	Wyoming, Minn.	end 89	240
GTE	Dec. 86	Cerritos, Calif.	mid 89	700
N.J. Bell	Spring 88	S. Brunswick, N.J.	Aug. 88	100
N.E. Tel	Oct. 88	Lynnfield, Mass.	4th Q 89	100
So. Bell	Sept. 87	Heathrow, Fla.	June 88	500
So. Bell	Fall 87	Hunter's Creek, Fla.	Fall 87	1900
So. Bell	Oct. 88	Governor's Island, N.C.	Spring 89	42
So. Bell	April 89	Coco Plum, Fla.	2nd Q 89	200-300
So. Bell	May 89	Savannah, Ga.	2nd Q 89	192
So. Bell	May 89	Lake View Terrace, Fla.	June 89	100
S.C. Bell	Early 88	Memphis, Tenn.	Fall 88	100
SW Bell	Fall 87	Leawood, Kan.	Oct. 88	148
SW Bell	Feb. 89	Ft. Worth, Texas	4th Q 89	80
SW Bell	Sept. 89	Olathe, Kan.	Oct. 89	250
U S West	Spring 88	St. Paul, Minn.	1st Q 89	100
U S West	July 88	Scottsdale, Ariz.	Fall 89	96

Fiber *continued*

trials are going smoothly. Bell Atlantic has learned about the hardware and equipment needed and about the work issues for turning up service. In Perryopolis, the Bell regional holding company has learned about building a relationship with a cable TV company, he says.

The South Brunswick trial, which began in August 1988, uses AT&T equipment. Princeton Gate was a new subdivision, which New Jersey Bell fitted with buried plant. The trial currently serves about 70 homes and will probably continue into the next year, since some of the homes are not yet constructed, O'Donoghue says.

The Perryopolis trial, which began in February, now serves approximately 65 customers with POTS and cable television. CATV service is provided from the CO through an agreement with Helicon Cable Co. The site was chosen since the aerial plant on both the telco and cable sides was relatively old and needed replacement. The telco laid fiber over the existing plant. Helicon is pleased with the trial, says O'Donoghue.

The fact that POTS (and cable TV, in the case of Perryopolis) is provided over fiber connected to their home should be transparent to customers in both trials, according to the company. Customers contacted by *Telephony* agreed.

"It's really hard to tell the difference in service," says Susan Szelc, a Perryopolis resident. "The only difference between our telephone service before and now is that before when you dialed, you would hear a clicking sound." Cable TV service is also unchanged, she says.

"What I see is really great. Everything put in is working fine," says Virginia Brooks, another Perryopolis resident.

Bell Atlantic has other trials planned, but can't announce them now, says O'Donoghue. As for a ubiquitous Bell Atlantic fiber-to-the-home network, he says, "It's not going to happen tomorrow." He estimates it will take 20 to 25 years, give or take 50%. Providing the service in Perryopolis has cost the telco an average of $5000 per subscriber, O'Donoghue also estimates.

The Fiber Leader

BellSouth is the most active RHC in trials, with eight POTS fiber-to-the-home trials in progress at Southern Bell and one in Memphis at South Central Bell. But two Southern Bell fiber projects, at Heathrow and Hunter's Creek, Fla., offer more. One important difference, the company stresses, is that these sites represent fiber-to-the-home *service*, not a trial.

Fiber-based POTS was turned up in June 1988 at the new Heathrow subdivision. In November 1988, ISDN over fiber was offered in the residences. Last June, video service was multiplexed on ISDN over the fiber. So far, 100 homes receive the service out of a potential targeted 256 homes. Customers pay for the regular POTS service and will pay for their cable, says Karen Mangum, project manager for BellSouth Services. The company is not yet charging for ISDN services.

"We're getting residents acclimated to using new services and seeing how they work," she says. The provision of residential ISDN service will be confined to Heathrow until the company finds out what customers want.

Heathrow and Hunter's Creek are going well from the POTS standpoint, Mangum notes. "Customers don't know the difference, which is how we want it. Signal quality is good and should be transparent. The video has quite good quality—high 40s and low 50s decibel signal-to-noise ratio—and an outstanding picture."

The telco began offering fiber to the home at the new Hunter's Creek subdivision in November 1986. Res-

continued on page 32

idents receive POTS and cable service over a combined use of single-mode and multimode fiber. One advantage of providing CATV over the telco's fiber is software control of programming, which allows the addition of premium channels without a service call. It also means there is no need for a console device for residents.

As Mangum noted, if residents notice any difference in service, they are pleased with the quality. Bernie Greenwood, a Hunter's Creek resident, doesn't notice any difference in his phone service, but sees considerable improvement in the cable TV service. Picture quality is much better now, he says.

There are some limits to cable, Greenwood notes. Only two cable channels can be provided to any one home, he says. So a third TV set within the home would have to be tuned to the same channel as one of the other two sets.

But Greenwood says he's not complaining, especially since the new service almost never goes out, even during heavy rains. "It would go out [during rainstorms] before. Now it would only go out if we lost complete power," he says.

SWB Pushes On

Southwestern Bell's trial in Leawood, Kan., ended in June. The cost of the project exceeded expectations, says John Coleman, area manager of loop technology and planning, but the technology worked as the company had planned.

"The expenses associated with providing, installing and repairing the fiber were more than we had anticipated," Coleman says. While declining to cite any specific figures, he says the primary expense was labor costs.

Fiber splicing nearly doubled the time it took for installation, Coleman says. An installation job that normally took one to two hours with copper wire became a three-and-a-half to four-hour job with fiber.

"But those prices will begin falling with new and improved splicing techniques," Coleman says.

The Leawood trial involved 100 customers in new homes and tested only POTS. Southwestern Bell is planning two additional trials where construction is under way.

In Olathe, Kan., 250 customers will receive POTS in a fiber-to-the-pedestal trial, and in Fort Worth, Texas, 80 customers will receive

POTS and CATV service. Both trials will take place in new subdivisions.

Coleman says Southwestern Bell is planning for at least one more trial to be deployed in the third or fourth quarter of 1990 that will involve existing homes.

GTE California is gearing up for its Cerritos trial, which is expected to involve 700 customers. Services, including voice, data and in some cases, video, should be up and running during the first and second quarters of 1990.

Unlike many other telcos, GTE is not just testing the technology.

"It's a research project. We want to know how to build the network of the future and what services people are going to want. We want to get the customer involved," says Erik Phelps, customer demonstration center administrator for GTE.

GTE also will look for future uses of coax cable during the trial, he says, and the trial will take fiber to existing homes.

"We all think fiber is the way to go," Phelps says. "But the customer may find that there's no difference. We're letting the consumer drive this."

Phelps says GTE plans to meet regularly with customers to gather input about the trial's progress.

Fiber Heats Up Everywhere

While U S West is looking to verify fiber-to-the-home technology in its Mendota Heights, Minn., and Scottsdale, Ariz., trials, it also is touting a unique element of its trials. The company plans to study the effect temperature has on fiber.

"The very warm temperatures are more of a concern," says Jerry Otto, director of facilities engineering for U S West. "Heat is an enemy of electronics. It can cause failure of electrical components. This gives us a good opportunity to bake the fiber in the Arizona sun."

U S West will offer POTS over fiber to about 100 customers in each city. The company is waiting for customers to purchase the new homes to be involved in the trials.

Otto says U S West will consider expanding the service offerings over fiber after the trials get under way. In addition, the company may look into conducting a trial at existing homes during the third or fourth quarter of 1990.

Contel Corp. currently is conducting a trial in Ridgecrest, Calif., where 25 homes are receiving POTS via fiber, and it is planning trials in Sidney, N.Y., and Wyoming, Minn.

Contel is pleased with preliminary results of the Ridgecrest trial, which show that there is little maintenance needed on the fiber, a company spokeswoman says.

Nynex had scheduled the last quarter of this year for the startup of its one-year Lynnfield, Mass., fiber-to-the-home trial. The trial, Nynex's first, will provide POTS using Raynet equipment to 100 homes. But the trial is not on schedule because of the labor strike, according to Joe Gagen, staff director, external affairs. "The trial won't start before the end of the year. We haven't tested the equipment yet," he says.

The prospect of ubiquitous fiber-to-the-home service has many, if not most, telephone companies excited. But despite telco enthusiasm, analysts seem to agree that installation won't happen overnight. Some convincing arguments will have to be made to regulators and, most of all, to customers.